

CLAIMS

What is claimed is:

- 1 1. In a network device having a redundancy platform including an active controller
2 system and a standby controller system, a method comprising:
3 receiving or generating a routing protocol state change by the active controller
4 system; and
5 replicating the received or generated routing protocol state change to the standby
6 controller system.
- 1 2. The method of claim 1, wherein the routing protocol state change includes a
2 Border Gateway Protocol (BGP) state change, a Routing Internet Protocol (RIP) state
3 change, an Open Shortest Path First Protocol (OSPF) state change, or an Intermediate
4 System-to-Intermediate System Protocol (IS-IS) state change.
- 1 3. The method of claim 1, wherein the replicating the received or generated routing
2 protocol state change includes replicating in realtime the received or generated routing
3 protocol state change from the active controller system into the standby controller
4 system.
- 1 4. The method of claim 1, further comprising:
2 receiving or generating a routing protocol message by the active controller
3 system; and

4 selectively replicating the received or generated routing protocol message in the
5 standby controller system.

1 5. The method of claim 4, wherein the routing protocol message includes a BGP
2 message, a RIP message, an OSPF message, or an IS-IS message.

1 6. The method of claim 1, further comprising:
2 detecting a failure in the active controller system; and
3 maintaining the same routing protocol state changes in the active controller
4 system prior to failure in the standby controller system.

1 7. The method of claim 1, further comprising:
2 performing Internet Protocol (IP) layer 3 service or a Multiprotocol Label
3 Switching (MPLS) service.

1 8. A network device comprising:
2 a standby controller system; and
3 an active controller system to receive or generate a routing protocol state change
4 and to replicate the received or generated routing protocol state change to the standby
5 controller system.

1 9. The network device of claim 8, wherein the routing protocol state change includes
2 a Border Gateway Protocol (BGP) state change, a Routing Internet Protocol (RIP) state

3 change, an Open Shortest Path First Protocol (OSPF) state change, or an Intermediate
4 System-to-Intermediate System Protocol (IS-IS) state change.

1 10. The network device of claim 8, wherein the active controller system is to replicate
2 in realtime the received or generated routing protocol state change to the standby
3 controller system.

1 11. The network device of claim 8, wherein the active controller system is to receive
2 or generate a routing protocol message and to replicate selectively the received or
3 generated routing protocol message to the standby controller system.

1 12. The network device of claim 11, wherein the routing protocol message includes a
2 BGP message, a RIP message, an OSPF message, or an IS-IS message.

1 13. The network device of claim 8, wherein the active controller system is to detect a
2 failure and the standby controller system is to maintain the same routing protocol state
3 changes in the active controller system prior to the failure.

1 14. The network device of claim 8, wherein the active controller system or standby
2 controller system is to perform an Internet Protocol (IP) layer 3 service or a Multiprotocol
3 Label Switching (MPLS) service.

1 15. The network device of claim 8, wherein the network device includes a network
2 router, switch, optical switch, bridge, hub, or gateway.

1 16. In a network device having a redundancy platform including an active controller
2 system and a standby controller system, a method comprising:

3 receiving or generating a Border Gateway Protocol (BGP) state change by the
4 active controller system; and

5 replicating the received or generated BGP state change to the standby controller
6 system.

1 17. The method of claim 16, wherein the replicating the received or generated BGP
2 state change includes replicating in realtime the received or generated BGP state change
3 to the standby controller system.

1 18. The method of claim 16, further comprising:

2 receiving or generating a BGP message by the active controller system; and

3 selectively replicating the received or generated BGP message to the standby
4 controller system.

1 19. The method of claim 16, further comprising:

2 detecting a failure in the active controller system; and

3 maintaining the same BGP state changes in the active controller system prior to
4 the failure in the standby controller system.

1 20. The method of claim 16, further comprising:
2 performing Internet Protocol (IP) layer 3 service or a Multiprotocol Label
3 Switching (MPLS) service.

1 21. In a network device having a redundancy platform including an active controller
2 system and a standby controller system, a method comprising:
3 receiving or generating a Transmission Control Protocol (TCP) state change by
4 the active controller system; and
5 replicating the received or generated TCP state change to the standby controller
6 system.

1 22. The method of claim 21, wherein the replicating the received or generated TCP
2 state change includes replicating in realtime the received or generated TCP state change
3 to the standby controller system.

1 23. The method of claim 21, further comprising:
2 receiving or generating a TCP message by the active controller system; and
3 selectively replicating the received or generated TCP message to the standby
4 controller system.

1 24. The method of claim 21, further comprising:
2 detecting a failure in the active controller system; and

3 maintaining the same TCP state changes in the active controller system prior to
4 the failure in the standby controller system.

1 25. The method of claim 21, further comprising:

2 performing Internet Protocol (IP) layer 3 service or a Multiprotocol Label

3 Switching (MPLS) service.

1 26. A network device comprising:

2 a standby controller system; and

3 an active controller system to receive or generate a Border Gateway Protocol

4 (BGP) state change or a Transmission Control Protocol (TCP) state change and to

5 replicate the received or generated BGP state change or TCP state change to the standby

6 controller system.

1 27. The network device of claim 26, wherein the active controller system is to

2 replicate in realtime the received or generated BGP state change or TCP state change to

3 the standby controller system.

1 28. The network device of claim 26, wherein the active controller system is to receive

2 or generate a BGP message or a TCP message and to replicate selectively the received or

3 generated BGP message or TCP message to the standby controller system.

1 29. The network device of claim 26, wherein the active controller system is to detect
2 a failure and the standby controller is to maintain the same BGP state changes and TCP
3 state changes as in the active controller system prior to the failure.

1 30. The network device of claim 26, wherein the active controller system or the
2 standby controller system is to perform an Internet Protocol (IP) layer 3 service or a
3 multiprotocol label switching (MPLS) service.

1 31. The network device of claim 26, wherein the network device includes a network
2 router, switch, optical switch, bridge, hub, or gateway.

1 32. A machine-readable medium that provides instructions, which if executed by a
2 processor, cause the processor to perform the operations comprising:
3 receiving or generating a routing protocol state change in an active system; and
4 replicating the received or generated routing protocol state change in a standby
5 system.

1 33. The machine-readable medium of claim 32, that further provides instructions,
2 which if executed by the processor, cause the processor to perform the operations
3 comprising:
4 receiving or generating a routing protocol message by the active system; and
5 selectively replicating the received or generated routing protocol message in the
6 standby controller system.

1 34. The machine-readable medium of claim 32, that further provides instructions,
2 which if executed by the processor, cause the processor to perform the operations
3 comprising:
4 detecting a failure in the active controller system; and
5 maintaining the same routing protocol state changes in the standby controller
6 system as in the active controller system prior to the failure.

1 35. The machine-readable medium of claim 32, that further provides instructions,
2 which if executed by the processor, cause the processor to perform the operations
3 comprising:
4 performing Internet Protocol (IP) layer 3 service or a multiprotocol label
5 switching (MPLS) service.

1 36. A network comprising:
2 one or more peer nodes; and
3 a redundant node to communicate with the peer nodes, the redundant node having
4 a redundancy platform including an active controller system and a standby controller
5 system, the active controller system is to receive or generate a routing protocol state
6 change and to replicate the received or generated routing protocol state change to the
7 standby controller system.

1 37. The network of claim 36, wherein the routing protocol state change includes a
2 Border Gateway Protocol (BGP) state change, a Routing Internet Protocol (RIP) state
3 change, an Open Shortest Path First Protocol (OSPF) state change, or an Intermediate
4 System-to-Intermediate System Protocol (IS-IS) state change.

1 38. The network of claim 36, wherein the active controller system is to replicate in
2 realtime the received or generated routing protocol state change to the standby controller
3 system.

1 39. The network of claim 36, wherein the active controller system is to receive or
2 generate a routing protocol message and to replicate selectively the received or generated
3 routing protocol message to the standby controller system.

1 40. The network of claim 39, wherein the routing protocol message includes a BGP
2 message, a RIP message, an OSPF message, or an IS-IS message.

1 41. The network of claim 36, wherein the active controller system is to detect a
2 failure and the standby controller system is to maintain the same routing protocol state
3 changes in the active controller system prior to the failure.

1 42. The network of claim 36, wherein the redundant node is to perform an Internet
2 Protocol (IP) layer 3 service or a multiprotocol label switching (MPLS) service.

1 43. The network of claim 36, wherein the redundant node includes a network router,
2 switch, optical switch, bridge, hub, or gateway.

1 44. A network comprising:
2 one or more peer nodes;
3 a redundant node to communicate with the peer nodes, the redundant node having
4 a redundancy platform including an active controller system and a standby controller
5 system, the active controller system is to receive or generate a Border Gateway Protocol
6 (BGP) state change or a Transmission Control Protocol (TCP) state change and to
7 replicate the received or generated BGP state change or TCP state change to the standby
8 controller system.

1 45. The network of claim 44, wherein the active controller system is to replicate in
2 realtime the received or generated BGP state change or TCP state change to the standby
3 controller system.

1 46. The network of claim 44, wherein the active controller system is to receive or
2 generate a BGP message or a TCP message and to replicate selectively the received or
3 generated BGP message or TCP message to the standby controller system.

1 47. The network of claim 44, wherein the active controller system is to detect a
2 failure and the standby controller is to maintain the same BGP state changes and TCP
3 state changes as in the active controller system prior to the failure.

1 48. The network of claim 44, wherein the active controller system or the standby
2 controller system is to perform an Internet Protocol (IP) layer 3 service or a multiprotocol
3 label switching (MPLS) service.

1 49. The network device of claim 44, wherein the redundant node includes a network
2 router, switch, optical switch, bridge, hub, or gateway.

1 50. In a network device having an active system and a standby system, a method
2 comprising:
3 maintaining in realtime routing protocol state changes received or generated by
4 the active system in the standby system;
5 detecting a failure in the active system; and
6 resuming operation by the standby controller system using the maintained routing
7 protocol state changes.

1 51. The method of claim 50, further comprising:
2 switching over operation of the active system to the standby system such that a
3 peer node does not observe the switchover.

1 52. The method of claim 51, wherein the resuming the operation by the standby
2 controller system includes:

3 resuming operation by the standby controller system such that a routing protocol
4 session with active system is not torn down.

1 53. A network device comprising:
2 a standby card; and
3 an active card to store persistent data, session states, and routing information and
4 to replicate in realtime the persistent data, session states, and routing information to the
5 standby card.

1 54. The network device of claim 53, wherein the active card generates changes to the
2 persistent data, session states, and routing information and replicates the changes to the
3 standby card.

1 55. The network device of claim 53, wherein the active card receives changes to the
2 persistent data, session states, and routing information from a peer node and replicates the
3 changes from the peer node to the standby card.

1 56. In a network device having a redundancy platform including an active controller
2 system and a standby controller system, a method comprising:
3 receiving a routing protocol state change from a peer node by the active controller
4 system;
5 sending the routing protocol state change to the standby controller system;

6 receiving a commitment to the routing protocol state change by the active
7 controller system from the standby controller system;
8 committing to the routing protocol state change in the active controller system;
9 and
10 sending the commitment to the peer node by the active controller system.

1 57. The method of claim 56, further comprising:
2 sending the routing protocol state change to a routing protocol after receiving the
3 commitment from the standby controller system.

1 58. The method of claim 56, further comprising:
2 sending the routing protocol state change to a routing protocol after receiving the
3 routing protocol state change from the peer node.

1 59. A network device comprising:
2 a standby controller; and
3 an active controller to receive a routing protocol state change from a peer node,
4 to send the routing protocol state change to the standby controller, to receive a
5 commitment to the routing protocol state change from the standby controller system, to
6 commit to the routing protocol state after receiving the commitment from the standby
7 controller, and to send the commitment to the peer node.

1 60. The network device of claim 59, wherein the active controller is to send the
2 routing protocol state change to a routing protocol after receiving the commitment from
3 the standby controller.

1 61. The network device of claim 59, wherein the active controller is to send the
2 routing protocol state change to a routing protocol after receiving the routing protocol
3 state change from the peer node.

1 62. A machine-readable medium that provides instructions, which if executed by a
2 processor, cause the processor to perform the operations comprising:
3 receiving a routing protocol state change from a peer node by an active controller
4 system;
5 sending the routing protocol state change to a standby controller system;
6 receiving a commitment to the routing protocol state change by the active
7 controller system from the standby controller system;
8 committing to the routing protocol state change in the active controller system;
9 and
10 sending the commitment to the peer node by the active controller system.

1 63. The machine-readable medium of claim 62, that further provides instructions,
2 which if executed by the processor, cause the processor to perform the operations
3 comprising:

4 sending the routing protocol state change to a routing protocol after receiving the
5 commitment from the standby controller system.

1 64. The machine-readable medium of claim 62, that further provides instructions,
2 which if executed by the processor, cause the processor to perform the operations
3 comprising:

4 sending the routing protocol state change to a routing protocol after receiving the
5 routing protocol state change from the peer node.